Chapter 1 Introduction

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1.1 Telecom Industry - Introduction

The word "telecommunication" is a compound of the Greek prefix "tele" meaning 'far off, and the Latin "communicare", meaning 'to share'. In its current usage, it refers to transmission of signals over a distance for the purpose of communication. In early days, communication between persons took place by means of drums, smoke signals, flags, etc. Emerging from such humble beginnings, the means now involve sophisticated high-speed, submarine optical cables laid on ocean floors and artificial satellites circling the Earth in space. As the demand for signal transmission has increased, the speed of transmission has also increased. Recently, scientists at Karlsruhe Institute of Technology in Germany have succeeded in transmitting 26 terabits (equal to about 700 DVDs or about 4 million average paperback books) of data per second at the distance of 50 kilometers.

The telecommunications industry has impact on every aspect of our lives, from the simple reality of enabling telephonic communication between people in different locations to enabling supply-chains to work seamlessly across continents to create products and fulfill demands. Telecommunication services are now recognized as a key to the rapid growth and modernization of the economy and an important tool for socio-economic development for a nation.

Telecommunications in India can be traced back to the 19th century when the British East India Company introduced telegraph services in India. The past two decades have been considered as the golden period for the telecommunications industry in India with exponential growth and development in terms of technology, penetration, as well as policy. All this has paralleled with the liberalization in this sector and huge investment by both domestic and foreign investors.

In today’s information age, the telecommunication industry has a vital role to play. Considered as the backbone of industrial and economic development, the industry has been aiding delivery of voice and data services at rapidly increasing speeds, and thus, has been revolutionizing human communication.
1.2 Telecom Industry - Evolution

Indian telecom sector is more than 165 years old. Telecommunications was first introduced in India in 1851 when the first operational land lines were laid by the government near Kolkata (then Calcutta), although telephone services were formally introduced in India much later in 1881. Further, in 1883, telephone services were merged with the postal system. In 1947, after India attained independence, all foreign telecommunications companies were nationalized to form the Posts, Telephone and Telegraph (PTT), a body that was governed by the Ministry of Communication. The Indian telecom sector was entirely under government ownership until 1984, when the private sector was allowed in telecommunication equipment manufacturing only. The government concretized its earlier efforts towards developing R&D in the sector by setting up an autonomous body – Centre for Development of Telematics (C-DOT) in 1984 to develop state-of-the-art telecommunication technology to meet the growing needs of the Indian telecommunication network. The actual evolution of the industry started after the Government separated the Department of Post and Telegraph in 1985 by setting up the Department of Posts and the Department of Telecommunications (DoT).

The entire evolution of the telecom industry can be classified into three distinct phases.

- Phase I - Pre Liberalization Era (1980-89)
- Phase II - Post Liberalization Era (1990-99)
- Phase III - Post 2000
Until the late 90s the Government of India held a monopoly on all types of communications – as a result of the Telegraph Act of 1885. As mentioned earlier, until the industry was liberalized in the early nineties, it was a heavily government-controlled and small-sized market. Government policies have played a key role in shaping the structure and size of the Telecom industry in India. As a result, the Indian telecom market is one of the most liberalized markets in the world with private participation in almost all of its segments. The New Telecom Policy (NTP-99) provided the much needed impetus to the growth of this industry and set the trend for liberalization in the industry.

Source: D & B Research
Telecom Sector in the Pre-liberalization Era (1980-1990)

Before liberalization, the public sector held a monopoly in provision of telecom services. The entire telecom services operation in the country was carried out by the Department of Telecommunication (DoT), a public sector entity established in 1985. It managed the planning, engineering, installation, maintenance, management, and operations of telecom services for the whole of India. In order to ease out its operations, two new public sector corporations viz. MTNL and VSNL were set up under the DoT in 1986. Thus, before the entry of the private players, the telecom services were provided by three public entities viz. DoT, MTNL and VSNL. While MTNL primarily looked after the operation of basic telephony services in Delhi and Mumbai, VSNL provided international telecom services in India. DoT looked after basic telephony operations in regions other than Delhi and Mumbai. Prior to liberalization the telecom services were broadly classified as domestic basic (which included basic telephony, telex and fax), domestic value-added services (VAS) which covered all other services such as paging, cellular, data services, VSAT and international basic and VAS.

Telecom Sector in the Post-liberalization Era

Private sector participation in the Indian telecom sector has been a gradual process, wherein the government initially permitted players from the private sector to provide Value Added Services (VAS) such as Paging Services and Cellular Mobile Telephone Services (CMTS), followed by the Fixed Telephony Services (FTS) or Basic services. Eventually the private sector has been allowed to provide almost all telecom services. Liberalization process in the telecom services market began in 1992, with the unbundling of the domestic basic services and the domestic VAS and entry of private players for providing the VAS such as cellular and paging services. During this period, the government provided licenses to private players according to the services that were to be provided in the specified areas of service provision. The country was divided into circles (or categories) on the basis of economic potential. Thus, primarily these divisions were mostly adjoining the states of India. Such demarcations were primarily responsible for existence of various regional players in provision of telecom services. During 1994, through a competitive bidding process, licenses were granted
to 8 CMTS operators in four metros, 14 CMTS operators in 18 state circles, paging operators in 27 cities and 18 state circles.

After the domestic VAS, the basic services were opened up to private players. The National Telecom Policy (NTP) 1994, which endeavored to build world-class telephone services in India and aimed at providing telephones on demand, enabled the entry of private players in the provision of basic services. Given the need for resources in addition to government sources for achieving the targets of NTP-94, private investments and involvement of the private sector was considered inevitable to bridge the resource gap. Thus, the private operators were allowed to render basic services in the local loop. Initially, the provision of basic services had been deliberated as a duopoly between a selected service provider and the DoT. In line with this, policy licenses were awarded to 6 BTS operators in 6 state circles.

The need for independent regulation had risen with the entry of private players. Also, to fulfill the commitments made when India joined the World Trade Organization (WTO) in 1995, the Telecom Regulatory Authority of India (TRAI) was established in 1997 to regulate telecom services including fixation/revision of tariffs. The establishment of TRAI was a positive step in terms of separation of regulations from policy making and operations, which continued to be under the purview of the DoT.

Further, in 1998, the Government also declared the policy for Internet Service Provision (ISP) by private operators and had even begun licensing of the same around that time. Subsequently the Global Mobile Personal Communications by Satellite (GMPCS) was also opened up for the private players.

Although the private players had been allowed to participate in many telecom services segments, the results of privatization had not been satisfactory entirely. Thus, a New Telecom Policy (NTP-99) was announced on March 26, 1999, which came into effect from April 1, 1999. The NTP 1999 not only provided a major boost to private sector participation in this industry but also laid down the path for significant development of the Indian telecom industry. The NTP 1999 allowed private operators providing cellular and basic service to migrate from a fixed license fee regime to a revenue sharing regime to make the operations of the private players financially viable. This policy change provided the much needed relief to private players who were earlier
burdened with huge debts that they had to service owing to their license fee commitments. Another notable provision of the Act had been the entry of multiple private sector operators in the sector in contrast to the policy of duopoly practiced earlier. This not only increased competition in the industry but also assisted the private players to attract new investment and augment their subscriber base. The entry of private operators in the cellular sector helped to reduce the operational cost of the industry. It also reduced the mobile tariffs and provided a much needed boost to the industry. The Act also made the following provisions: it permitted interconnectivity and sharing of infrastructure among various service providers within same areas of operations; it allowed both voice and data traffic by service providers; it opened up national long distance (NLD) and international long distance (ILD) services to competition et al. Thus, the NTP 1999 can be viewed as the genesis of the cellular revolution being witnessed in India.

The NTP 99 had also enunciated to separate the policy and licensing functions of the DoT from the service providing functions to ensure a level-playing-field among private operators and incumbents. Accordingly, as a predecessor to corporatization, two new departments, viz. Department of Telecom Services (DTS) and the Department of Telecom Operations, were carved out of DoT, to separate the service provision and operational functions of DoT. Later in 2000, DTS was corporatized and renamed as Bharat Sanchar Nigam Ltd (BSNL), and thus the functions of the incumbent service provider were separated from that of the policy maker. DoT is now responsible for policy-making, licensing and promoting private investments in both telecom equipment manufacturing and in telecom services. Subsequently in 2002, even VSNL was privatized and its monopoly in ILD services was terminated (from March 31, 2002).

**Current Structure of the Indian Telecom Industry**

Currently, both public sector players as well as the private sector players are actively catering to the rapidly growing telecommunication needs in India. Private participation is permitted in all segments of the telecom industry, including ILD, DLD, basic cellular, internet, radio paging, et al. The broad structure of the telecom industry (in terms of service providers) is depicted in the diagram below:
After the privatization of VSNL in 2002, only two premier PSUs, MTNL and BSNL operate in India and provide various telecom services. As noted earlier, MTNL operates in Delhi and Mumbai and BSNL provides services to the remaining country. In the post-liberalization era, these PSUs not only have made significant progress but also have provided stiff competition to their private counterparts.

Private operators have played a very crucial role in the growth of the telecommunication industry, primarily in the mobile services. With the liberalization of the telecom industry, the private sector has been increasing its foothold in the telecom services space. After the introduction of NTP-99, the contribution of private players towards telecom services has witnessed rapid strides. While the private sector is instrumental in providing both fixed line as well as wireless services, it is mainly active in the wireless segment. The fixed lines account for only about 2% of private sector's total subscriber base. While some private players have a pan-India presence, there are many regional players that cater to only certain service areas.

Following is the list of private sector service providers:
### 1.1 List of Private Sector Service Providers

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Service Provider</th>
<th>Area for which licensed with No.</th>
<th>UASL</th>
<th>CMTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bharti</td>
<td>All India (22)</td>
<td>All India except NE</td>
<td>North East</td>
</tr>
<tr>
<td>2</td>
<td>Aircel Group</td>
<td>All India (23)</td>
<td>All India except Chennai &amp; TN</td>
<td>Chennai &amp; Tamil Nadu</td>
</tr>
<tr>
<td>3</td>
<td>Reliance Communications</td>
<td>All India (except Assam &amp; NE) (20)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Reliance Telecom</td>
<td>Kolkata, MP, WB, HP, Bihar, OR, Assam &amp; NE (8)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Vodafone</td>
<td>All India (23)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tata Teleservices</td>
<td>All India (22)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>IDEA</td>
<td>All India (22)</td>
<td>Mumbai, TN incl. Chennai, Kolkata, Karnataka, WB, Punjab, Bihar, Orissa, Assam, NE &amp; J&amp;K</td>
<td>AP, Delhi, Maharashtra, Gujarat, MP, Kerala, Haryana, HP, UP-W, UP-E, Rajasthan</td>
</tr>
<tr>
<td>8</td>
<td>Shyam Telelink</td>
<td>All India (22)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Loop Telecom Private Ltd &amp; Loop Mobile (India) Ltd</td>
<td>All India (22)</td>
<td>All except Mumbai</td>
<td>Mumbai</td>
</tr>
<tr>
<td>10</td>
<td>Unitech Group</td>
<td>All India (22)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Videocon Telecommunications Ltd.</td>
<td>All India except Pb (21)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Etisalat DB Telecom Pvt Ltd &amp; Allianz</td>
<td>Delhi, Mumbai, Mah, Guj, AP, KTK, TN incl. Chennai, Ker, Punjab, HR, UP(W), UP(E), Raj, MP &amp; Bihar (15)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Spice Communications</td>
<td>Delhi, Mali, AP, KTK, Punjab, Har (6)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>S Tel Ltd</td>
<td>HP, Bihar, Orissa, Assam, NE, J&amp;K (6)</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>HFCL</td>
<td>Punjab (1)</td>
<td>Punjab</td>
<td></td>
</tr>
</tbody>
</table>

Source: DoT and Service Providers
1.3 Telecom Industry India - Overview

The modern system of communications in India started with the establishment of telegraph network. In order to ensure telegraph network's exclusivity and establish government control over electronic communications, various telegraph statutes were enacted by the Government of India which laid the foundation of the present regulatory framework governing telecommunications (both wired and wireless). In early days, India witnessed increasing number of wired telephone connections. Even when wireless communication was introduced in the form of cellular phones, it was not immediately accepted by the Indian masses, mainly on account of high price of cellular phones as well as high tariff structure prevalent at that point in time. Gradually, with the price of cellular handset as well as mobile (wireless) tariff reducing there was increasing adoption of wireless communications. Today the Indian telecom industry is already witnessing the lowest telecom tariff globally.

Like elsewhere, telecommunications in India started as a state monopoly. In the 1980s, telephone services and postal services came under the Department of Posts and Telegraphs. In 1985, the government separated the Department of Post and created the Department of Telecommunications ("DoT"). As part of early reforms, the government set up two new public sector undertakings: Mahanagar Telephone Nigam Limited ("MTNL") and Videsh Sanchar Nigam Limited ("VSNL"). MTNL looked after telecommunications operations in two megacities, Delhi and Mumbai. VSNL provided international telecom services in India. DoT continued to provide telecommunications operations in all regions other than Delhi and Mumbai. It is important to note that under this regime, telecommunication services were not treated to be a necessity that should be made available to all people but rather a luxury possible for select few.

In the early 1990s the Indian telecom sector, which was owned and controlled by the Indian government, was liberalized and private sector participation was permitted through a gradual process. First, telecom equipment manufacturing sector was completely deregulated. The government then allowed private players to provide value added services ("VAS") such as paging services. In 1994, the government unveiled the National Telecom Policy 1994 ("NTP 1994"). NTP 1994 recognized that
existing government resources would not be sufficient to achieve telecom growth and hence private investment should be allowed to bridge the resource gap especially in areas such as basic services. As markets and telecom technologies started converging and the differences between voice (both fixed and wireless) and data networks started blurring, the need for developing the modern telecom network became an immediate necessity. Accordingly, private sector participation was allowed in basic services.

The government anticipated that a major part of the growth of the country's GDP would be reliant on direct and indirect contributions of the telecom sector and accordingly the need for a comprehensive and forward looking telecommunications policy was felt. This then paved way for New telecom Policy 1999 ("NTP 1999") which largely focused on creating an environment for attracting continuous investment in the telecom sector and allowed creation of communication infrastructure by leveraging on technological development. The main objectives and targets of NTP 1999 were as follows:

- Availability of affordable and effective communications for citizens;
- Strive to provide a balance between the provision of universal service to all uncovered areas, including the rural areas and the provision of high-level services capable of meeting the needs of the country's economy;
- Create a modern and efficient telecommunications infrastructure taking into account the convergence of IT, media, telecom and consumer;
- Protect the defense and security interests of the country.

NTP 1999 allowed private operators providing cellular and basic services to migrate from a fixed license fee regime to a revenue sharing regime which made it financially viable for such operators to function in the market. Most importantly, the government recognized the necessity to separate the government's policy wing from its operations wing so as to create a level playing field for private operators. Accordingly the NTP 1999 directed the separation of the policy and licensing functions of DoT from the service provision functions. The Government corporatized the operations wing of DoT in October 2000 and named it as Bharat Sanchar Nigam Limited ("BSNL") which operates as a public sector undertaking. Thereafter in 2002, the monopoly of VSNL also came to an end.
1.4 Telecom Authorities - India

1.4.1 Telecom Commission:

The Telecom Commission is an inter-ministerial high level government body. The Commission consists of a Chairman, four full time members, who are ex-officio, Secretary to the Government of India in the Department of Telecommunications and four part time members who are the Secretaries to the Government of India of the concerned Departments. The essential functions of the Telecom Commission are as under:

- Policy formulation, licensing and coordination matters relating to telegraphs, telephones, wireless, data, facsimile services and other similar forms of communications;
- International cooperation in matters connected with telecommunications;
- Promotion of standardization, research and development in telecommunications;
- Promotion of private investment in telecommunications; preparing the DoT budget and supervising its operations
1.4.2 Department of Telecommunications ("DoT"):

As per the Indian Telegraph Act, 1885 and the Indian Wireless Telegraphy Act, 1933 the Central Government has the exclusive privilege of establishing, maintaining and working telegraph and wireless telegraphy equipment and is the authority to grant licenses for such activities. Some of the important functions of the DoT are as follows:

- Licensing and Regulation

- International cooperation in matters connected with telecommunications (such as International Telecommunication Union (ITU), International Telecommunication Satellite Organization (INTELSAT), etc;

- Promotion of private investment in the Indian telecommunications sector;

- Promotion of standardization, research and development in telecommunications

1.4.3 Telecom Regulatory Authority of India ("TRAI"):

TRAI is an autonomous statutory body established under Telecom Regulatory Authority of India Act, 1997 ("TRAI Act") Liberalization made it necessary for the Government to ensure that there is an independent communications regulator. TRAI acts as an independent regulator of the telecommunications industry in the country. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition amongst various telecom players. TRAI's powers are recommendatory, mandatory, regulatory and judicial.

The important recommendatory powers of TRAI are as follows:

- Recommendations regarding the need and timing for introduction of new service providers.

- Recommendations pertaining to the grant of telecom licenses including their terms and conditions recommend revocation of license for non-compliance of terms and conditions of license.
TRAI is the sole authority empowered to take binding decisions on fixation of tariffs for provision of telecommunication services.

Emphasis needs to be placed on the interplay between the recommendatory powers of TRAI and the policy making powers of DoT. While the DoT is the sole authority for licensing of all telecommunications services in India, it is mandatory for the DoT to have before it TRAI's recommendations with regard to matters over which TRAI has recommendatory powers (mentioned above). Having done so, the DoT has the discretion to either accept or reject the recommendations of TRAI. TRAI has over the years come out with a number of recommendations; DoT has accepted some such recommendations either wholly or partially or has rejected such recommendations. Below is the status of some of the recommendations made by TRAI to the DoT:

In this respect, there have been concerns that the very reason for the establishment of TRAI has been nullified in that a regulatory body whose specialist recommendations are not bound to be followed may be considered to be a paper tiger after all especially when comparisons are drawn with the more advanced regulatory agencies of the world such as the Federal Communications Commission (FCC) of the US which has been entrusted with very wide powers in telecom regulation including the granting of licenses.

There have been some recent reports wherein the government is considering giving wider powers to TRAI, however there has been no formal policy change as yet.

The DoT had sought a legal opinion from the law ministry which stated that the DoT can change the terms and conditions of existing licenses and that TRAI's recommendations were not binding on the government. Subsequently, TRAI also obtained an independent legal opinion on the same subject from a former Supreme Court judge, who was also the former chairman of law commission, as well as from a noted Supreme Court lawyer, stating that the DoT cannot make any modifications to telecom licenses without consulting TRAI. The DoT has now referred both sets of opinions back to the law ministry to take a final call on this issue. The final outcome will define the scope of regulators in the country.
1.4.4 Telecom Disputes Settlement and Appellate Tribunal ("TDSAT"):

The TDSAT was established in 2000 under an amendment to the Telecom Regulatory Authority of India Act, 1997. The TDSAT has been vested with exclusive powers to adjudicate any dispute between:

- The licensor (DoT) and a licensee;
- Service providers; and
- Service providers and groups of customers

Any appeal from the decision of the TDSAT can be filed only with the Supreme Court of India which is the apex court of the country.

1.4.5 Wireless Planning and Co-ordination Wing ("WPC"):

The WPC was created in 1952 and is a wing of the DoT which is responsible for Frequency Spectrum Management, including licensing of wireless stations and caters to the needs of all wireless users (Government and Private) in India. It exercises the statutory functions of the Central Government and issues licenses to establish, maintain and operate wireless stations. WPC is divided into (i) Licensing and Regulation (LR), (ii) New Technology Group (NTG) and (iii) Standing Advisory Committee on Radio Frequency Allocation (SACFA). The WPC is also the central agency for the purpose of representing India and to adhere to India's commitments at the International Telecommunication Union ("ITU"), Asia-Pacific Tele-community ("APT") and other organizations that India is a member or signatory of. The WPC is headed by the Wireless Advisor to the Government of India.

1.4.6 National Frequency Allocation Plan ("NFAP"):

The NFAP is the basis on which spectrum frequencies are allocated in India. The ITU issues the international frequency table for the purpose of giving the member countries a basis on which they can formulate their own frequency allocation plan. The NFAP is the frequency allocation plan of India. This plan clearly allocates different frequency bands for different radio-communication services. Although it allocates frequency bands for certain services, it does not give ownership rights to
those services. NFAP-81 was in force till December 31, 1999 for commercial and other uses. NFAP-81 was formulated for a time, when usage of frequency bands was primarily done by the government agencies with some exploitation by private parties for their dedicated networks. However with the proliferation of new technologies in the country and the entry of the private sector in the telecommunication field the government decided it was prudent to revise NFAP-81. Accordingly, from January 1, 2000 the NFAP-2000 replaced NFAP-81 in order to better manage the increased use of spectrum. Later NFAP 2008 which was made effective from April 1, 2009 replaced NFAP 2000. NFAP 2011 has been developed with special emphasis to encourage / promote indigenous manufacturing / technologies by provisioning of small chunk of spectrum in certain frequency band /sub-bands in limited geographical area.

The WPC Wing of the DoT is now amidst formulating NFAP 2011. The WPC Wing issued the draft NFAP 2011 in March 2011 upon which various inputs have been provided. Various government departments and telecom operators have written to the DoT and expressed disagreement with the draft plan. The DoT will be sending all these views to the Empowered Group of Ministers (EGoM), which will come up with the final version of the NFAP 2011. It is expected that the issues pertaining to encryption, VOIP, new and emerging technologies, satellite phones, spectrum allocation, etc will be properly addressed in NFAP 2011.

1.4.7 Standing Advisory Committee on Frequency Application ("SACFA"):

SACFA is a wing of the DoT which gives approval for radio frequency (spectrum) used by telecom service providers. Obtaining a telecom license is not enough for the operator to begin rolling out the services; a no objection from SACFA is required. This involves a detailed technical evaluation including field studies in order to determine inter alia possible aviation hazards and interference (Electro Magnetic Interference (EMI)/Electro Magnetic Compatibility (EMC)) to existing and proposed networks.
Functions of SACFA:

- To recommend on major frequency allocation, issues requiring co-ordination amongst the various wireless users in the country.
- To formulate/review the National Frequency Allocation Plans.
- To formulate national proposals for international conferences/meetings and to co-ordinate nationally all activities pertaining to the ITU, etc.
- To deal with frequency co-ordination problems referred to the committee by the administrative Ministries/Departments.
- To clear sites of all wireless installations in the country.
1.5 Telecom Industry - Regulatory Framework

The Indian telecom industry has been one of the best performing industry groups in the recent years. In order to facilitate the sector several reforms have been introduced in the sector during the past decade. The National Telecom Policy of 1994 and the New Telecom Policy of 1999 (NTP-99) has been the driving force of the development and liberalization in this sector. Since its inception, Department of Telecommunication (DoT) is formulating developmental policies for driving the growth of the telecom sector.

1.5.1 Pre-Liberalization Scenario

In the 1880s telephone services were merged with the postal system and the telecom services came under the monopoly of the Department of Post and Telegraph. The Indian telecom sector was entirely under government ownership till the 1980s. In 1984, the private sector was allowed only in telecommunication equipment manufacturing. As a part of the early reforms, the government set up an autonomous body, the Centre for Development of Telematics (C-DOT) in 1984, to develop the R&D activity in the telecom sector. It was set up to develop the state-of-the-art telecommunication technology to meet the needs of the Indian telecommunication network.

The government separated the Department of Post and Telegraph in 1985 by setting up the Department of Post and the Department of Telecommunication (DoT). The DoT was established as a wholly-owned government operator for the entire telecom service operation in India. The responsibility for managing the planning, engineering, installation, maintenance, management, and operations of telecom services lay with the DoT.

In order to ease out DoT operations, the government set up two new public sector corporations, MTNL and VSNL, under the DoT in 1986, however, the government retained policy formulation and regulation decisions with the DoT. While MTNL was established to look after the operation of basic telephony services in metros such as Mumbai and New Delhi, VSNL was set up to operate, develop and accelerate international telecom services in India. The Telecom Commission was set up in 1989
as an executive body to assist the DoT in policy regulation, licensing, wireless spectrum management, administrative monitoring of PSUs, research and development and standardization/validation of equipment etc.

1.5.2 Liberalization Policy 1991

In 1991, India adopted the new economic policy of liberalization. The policy aimed at improving viability, competitiveness and efficiency of the Indian economy in the international market and also for enhancement and growth of international trade. To attain the objectives of new economic policy a telecom service of world class quality was essential. Thus thrust in reforms in the telecommunication sector was witnessed during the 1990s along with the liberalization of the economy. Liberalization in telecommunication services began in 1992 when the telecom sector was deregulated with the Government unbundling the domestic basic services and the domestic value-added services (VAS) and allowing private sector participation in provision of value added system (VAS) such as cellular and paging services. The government paved the path for the entry of the private sector in telephone services by adopting the National Telecom Policy in 1994. This policy aimed at bringing about universal service and qualitative improvement in telecom services.

1.5.3 National Telecom Policy 1994 (NTP-94)

The National Telecom Policy was announced in 1994 which aimed at improving India's competitiveness in the global market and to provide a base for a rapid growth in exports. This policy eventually facilitated the emergence of Internet services in India on the back of established basic telephony communication network. This policy also paved way for the entry of the private sector in telephone services.

The main objectives of the policy were:

- To ensure telecommunication is within the reach of all, that is, to ensure availability of telephone on demand as early as possible
- To achieve universal service covering all villages, that is, enable all people to access certain basic telecom services at affordable and reasonable prices
To ensure world-class telecom services. Remove consumer complaints, resolve disputes and encourage public interface and provide a wide permissible range of services to meet the demand at reasonable prices

To ensure that India emerges as a major manufacturing base and major exporter of telecom equipment

To protect the defense and security interests of the nation.

The policy also announced a series of specific targets to be achieved by 1997 and further recognized that to achieve these targets the private sector association and investment would be required to bridge the resource gap.

Thus, to meet the telecom needs of the nation and to achieve international comparable standards, the sector for manufacture of telecom equipment had been progressively relicensed and the sub-sector for value-added services was opened up to private investment (July 1992) for electronic mail, voice mail, data services, audio text services, video text services, video conferencing, radio paging and cellular mobile telephone. The private sector participation in the sector was carried out in a phased manner. Initially the private sector was allowed in the value added services, and thereafter, it was allowed in the fixed telephone services. Subsequently, VSAT services were liberalized for private sector participation to provide data services to closed user groups.

1.5.4 Establishment of TRAI

The entry of private players necessitated independent regulation in the sector; therefore, the TRAI was established in 1997 to regulate telecom services, for fixation/revision of tariffs, and also to fulfill the commitments made when India joined the World Trade Organization (WTO) in 1995. The establishment of TRAI was a positive step as it separated the regulatory function from policy-making and operation, which continued to be under the purview of the DoT.

The functions allotted to the TRAI included:

a. To recommend the need and timing for introduction of new service provider
b. To protect the interest of customers of telecom services

c. To settle disputes between service providers

d. To recommend the terms and conditions of license to a service provider

e. To render advice to the Central government on matters relating to the development of telecommunication technology and any other matter applicable to the telecommunication industry in general.

1.5.5 New Telecom Policy 1999 (NTP-99)

In recognition of the fact that the entry of the private sector, which was envisaged during NTP-94, was not satisfactory and in response to the concerns of the private operators and investors about the viability of their business due to non realization of targeted revenues the government decided to come up with a new telecom policy. Moreover, convergence of both markets and technologies required realignment of the industry. To achieve India’s vision of becoming an IT superpower along with developing a world class telecom infrastructure in the country, there was a need to develop a new telecom policy framework. Accordingly, the NTP 1999 was framed with the following objectives and targets:

- Availability of affordable and effective communication for citizens was at the core of the vision and goal of the new telecom policy

- Provide a balance between provision of universal service to all uncovered areas, including rural areas, and the provision of high-level services capable of meeting the needs of the economy

- Encourage development of telecommunication facilities in remote, hilly and tribal areas of the nation

- To facilitate India’s journey to becoming an IT superpower by creating a modern and efficient telecommunication infrastructure taking into account the convergence of IT, media, telecom and consumer electronics
• Convert PCOs, wherever justified, into public telephone information centers having multimedia capability such as ISDN services, remote database access, government and community information systems etc

• To bring about a competitive environment in both urban and rural areas by providing equal opportunities and level playing field for all players

• Providing a thrust to build world-class manufacturing capabilities and also strengthen research and development efforts in the country

• Achieve efficiency and transparency in spectrum management

• Protect the defense and security interests of the country

• Enable Indian telecom companies to become global players.

In line with the above objectives, some of the specific targets of the NTP 1999 were:

• Make available, telephone on demand by 2002 and achieve a teledensity of 7% by 2005 and 15% by 2010

• Encourage development of telecom in rural areas by developing a suitable tariff structure so that it becomes more affordable and by also making rural communication mandatory for all fixed service players and thus achieve a rural teledensity of 4% by 2010 and provide reliable transmission media in all rural areas.

1.5.6 Developments After 2000

There were major developments on the policy front post year 2000. Establishment of Bharat Sanchar Nigam Ltd (BSNL) (2000), privatization of VSNL (2002), termination of monopoly of VSNL in International Long Distance, opening up of National Long Distance (NLD) and International Long Distance (ILD) services to competition (2000), introduction of Unified Access Licensing (UASL) regime (2003), implementation of calling party pays (CPP) (2003), increase in FDI limits from 49% to 74% (2005) and proposal for mobile number portability (2006) which paved way for the remarkable growth in the sector.
1.5.7 Universal Service Obligations

The Government is committed to provide access to all people for basic telecom services at affordable and reasonable prices. In order to increase access to telecommunication within rural areas as well as increase teledensity, the government set up a Universal Service Obligation Fund (USOF) in 2002. This fund is expected to help in achieving universal service obligations (as laid down in the NTP 1999). The fund is used to subsidize the developments in the telecom sector in the rural areas. It is used to provide support for increasing wireless network in rural and remote areas. The fund is also expected to cover both public accesses through public or community telephones in villages as well as individual household telephones in identified net high cost rural/remote areas. The infrastructure for mobile and broadband services in rural areas is to be created from this fund to aid increase in rural teledensity. The Indian Telegraph Act (1885) has been amended and mobile services have been included under basic telephony in rural areas to further help the cellular operators to access the USOF, which will help them to finance telecom infrastructure in rural areas.

The resources for meeting the USO would be raised through a ‘universal access levy’. This would constitute a percentage of the revenue earned by all the operators under various licenses. The implementation of the USO obligation for rural / remote areas would be undertaken by all fixed service providers who will be reimbursed from the funds collected from the universal access levy. Other service providers will also be encouraged to participate in USO provision subject to technical feasibility and shall be reimbursed from the funds from the universal access levy.

1.5.8 Universal Access Regime

In 2001, basic service operators in India were permitted to offer limited mobility services over wireless local loop (WLL (M)) using CDMA technology in their coverage areas. Moreover, they were also able to offer all-India mobility using the CDMA WLL (M) technology. The regime resulted in increasing the popularity of these services, as the prices of these services were generally lower than that for GSM cellular mobile services. This created a potential disadvantage for the GSM cellular operators as they had paid substantial amounts to obtain their licenses and WLL (M) services were increasingly seen as largely substitutable for GSM services; as a result,
the government decided to move towards a Unified Access Services Licensing regime for basic and cellular services, which was introduced in October 2003. The focus of the effort was on technological advancement. Under the new licensing regime, both basic service operators and cellular carriers gained freedom to offer basic and/or cellular mobile services using any technology, which has ensured a fair competitive market for the service providers.

1.5.9 Interconnection Usage Charges Regime (2003)

Interconnection is very important for the service providers and users. A variety of access networks - fixed and mobile, national long distance network and international long distance networks have to interconnect with each other to make local, national and international calls possible. In order to have seamless end-to-end service, it is imperative to have an effective interconnection usage charges (IUC) regime in place.

The TRAI implemented the Telecommunication Interconnection Usage Charges (IUC) Regulation during 2003 to fix the terms and conditions of interconnectivity between service providers, to ensure effective interconnection between different service providers and to regulate arrangements among service providers for sharing their revenue derived from providing telecommunication services.

The regulation aimed to cover arrangements among service providers for payment of IUC for telecommunication services, covering basic service, which included WLL (M) services, cellular mobile service providers and long distance operators throughout India.

On March 9, 2009, the TRAI issued the ‘Telecommunication Interconnection Usage Charges (Tenth Amendment) Regulations’ with the below-mentioned key features. The new charges came into effect from April 1, 2009:

- Termination charge for all types of domestic calls: fixed to fixed, fixed to mobile, mobile to fixed and mobile to mobile has been reduced to 20 paise per minute from 30 paise per minute
- Termination charge for incoming international calls will be 40 paise per minute against the existing charge of 30 paise per minute. The authority
expects that the service providers will pass on this benefit in the form of lower tariff for outgoing international calls

- Ceiling on carriage of domestic long distance calls retained at 65 paise per minute. Non-reduction of this ceiling will encourage NLD operators to expand into rural areas

- Origination charge has not been specified as it will be residual from tariff after payment of other charges. This will provide service providers flexibility of introducing innovative tariff plans

- Transit/carriage charge from Level-II Trunk Automatic Exchange to Short Distance Charging Area (SDCA) to be 15 paise per minute as against existing charge of 20 paise per minute

- Intra SDCA transit charge to be less than 15 paise per minute down from less than 20 paise per minute

- Termination charge for 3G voice calls shall be same as 2G voice calls.

1.5.10 Broadband Policy (2004)

TRAI constantly monitors growth of internet services in India. In December 2003, penetration of broadband and internet services in India was very low at 0.02% and 0.43%, respectively; as a result, the government announced the Broadband Policy on 2004 on the basis of TRAI recommendations to facilitate greater levels of penetration. The policy estimated the internet subscribers to grow to 40 mn and broadband subscribers to grow to 20 mn by 2010, which would include subscribers using various technologies. The Broadband Policy Framework virtualized creation of infrastructure through various access technologies, which could contribute to growth and could coexist.

The policy aimed at improving the quality of services (especially rural) and covering 20 mn subscribers by the end of 2010. It also aimed at creation of an environment for promoting knowledge-based society. It was also realized that improving broadband connectivity would bring about major implications such as creation of e-governance, online education, telemedicine networks and connectivity for rural knowledge centers,
greater integration into the world economy through international voice and videoconferencing, lower prices for NLD and ILD etc.

Moreover, the Ministry of Information and Technology has proposed establishing a National Knowledge Network to inter-connect all knowledge institutions through an electronic digital broadband network. The new broadband policy encouraged creation and growth of infrastructure through various access technologies that can mutually coexist such as optical fibre technologies, digital subscriber lines on copper loop, cable TV network, satellite, and terrestrial wireless technologies. The telecom regulator also suggested a range of measures for an open-sky policy for DTH, VSAT4 and uplinking, using satellites that could boost broadband.
1.5.11 Foreign Direct Investment (FDI)

One of the important sources of the substantial financial investment required for the growth of tele-density has been FDI. In 2005, the government permitted 74% foreign investment in telecom companies from the earlier limit of 49% which resulted in unprecedented entry of foreign investment in the sector. The table below enumerates the FDI policy related to the telecom sector:

1.2 FDI Policy for Indian Telecom Sector

<table>
<thead>
<tr>
<th>Sector/Activity</th>
<th>FDI Cap / Equity</th>
<th>Entry Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Telecommunications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Basic and cellular, Unified Access Services, National/International Long Distance, V-Sat, Public Mobile Radio Trunked Services (PMRTS), Global Mobile Personal Communications Services (GMPCS) and other value added telecom services</td>
<td>74% (Including FDI, FII, NRI, FCCBs, ADRs, GDRs, convertible preference shares and proportionate Foreign equity in Indian promoters/Investing Company)</td>
<td>Automatic up to 49%, FIPB beyond 49%.</td>
</tr>
<tr>
<td>b. ISP with gateways, radio- paging, end-to-end bandwidth.</td>
<td>74%</td>
<td>Automatic up to 49%, FIPB beyond 49%.</td>
</tr>
<tr>
<td>c. ISP without gateway, infrastructure provider providing dark fibre, right of way, duct space, tower (Category I), electronic mail and voice mail</td>
<td>100%</td>
<td>Automatic up to 49%, FIPB beyond 49%.</td>
</tr>
<tr>
<td>d. Manufacture of telecom equipments</td>
<td>100%</td>
<td>Automatic (Subject to sectoral requirements)</td>
</tr>
</tbody>
</table>

Source: DIPP
1.5.12 Guidelines for Intra Circle Mergers and Acquisitions

In January 2004, the government issued guidelines for intra circle mergers of licenses in telecom sector. According to the guidelines, post-merger there should be at least three operators in a particular service area for a particular service and the market share of the merged entity would not exceed 67%. Also, merger in the same service area was to be divided into two distinct categories: fixed and mobile services. While merger of companies holding different service licenses is permitted, a standalone basic service license cannot be merged with a standalone cellular service license and vice versa. Accordingly, with prior approval of DoT, merger of licenses is permitted in the following categories: cellular license with cellular license; basic license with basic license; unified access service license (UASL) with unified access service license; basic with unified access service license and cellular with unified access service. All the mergers are to be notified to the TRAI and the merged entity is required to obtain the approval of DoT for the proposed merger. The merged entity is entitled to the total spectrum held by the merging entities subject to the condition that post-merger, the amount of spectrum does not exceed 15 MHz per operator per service area for metros and category A service areas and 12.4 MHz per operator per service area in category B and category C service areas. The merged spectrum subject to these entities will remain with the merged entity.

1.5.13 Revised Guidelines for Intra Circle Mergers and Acquisitions

The DoT issued revised guidelines for intra service area merger of Cellular Mobile Telephone Service (CMTS)/ UAS licenses on April 2008 thus replacing the guidelines issued in 2004. Some of the salient features and changes introduced by the revised merger guidelines are as follows:

- Merger of licenses would be restricted to the same service area and prior approval from the DoT would be a must

- Merger of licence(s) shall be permitted in the following category of licences - Cellular Mobile Telephone Service (CMTS) Licence with Cellular Mobile Telephone Service (CMTS) Licence; Unified Access Services Licence (UASL) with Unified Access Services Licence (UASL); Cellular Mobile
Telephone Service (CMTS) Licence with Unified Access Services Licence (UASL)

- The relevant service market will be defined as wireline and wireless services wherein wireless service market shall also include fixed wireless

- Moreover, any permission for merger shall be accorded only after 3 years from the effective date of the licences

- According to the new guidelines, a merger shall not be allowed if the number of UAS/CMTS access service providers fall below four in the relevant market and the market share of the merged entity in the relevant market exceeds 40%, either in terms of separate subscriber base for wireless and wireline services or in terms of adjusted gross revenue. This 40% threshold has been reduced from a market share of 67% determined under the previous guidelines

- Duly audited adjusted gross revenue of licensee in the relevant market and the market share of both subscriber base shall be considered to decide the level of dominance for regulating the M&A activity. If after the merger of licences in a service area, the licensee becomes a “significant market power” (SMP), then the extant rules and regulations applicable to SMPs will also apply to the merged entity

- Following the merger of licences in a service area, the post-merger licensee shall be entitled to the total amount of spectrum held by the merging entities, subject to the condition that after merger, licensee shall meet, within a period of 3 months from date of approval of merger by the licensor, the prevailing spectrum allocation criterion separately for GSM and CDMA technologies, as in case of any other UAS/CMTS licensee(s)

- In case of failure to meet the spectrum allocation criterion within the period of 3 months, post-merger licensee shall surrender the excess spectrum. In addition, after expiry of 3 months, the applicable rate of spectrum charge will double every 3 months in case of excess spectrum held by post-merger licensee. Further, the spectrum transfer charge, shall be payable within the prescribed period as specified by the government
• Post merger, spectrum enhancement charge will be charged as applicable in case of any other UAS/CMTS licensee. Moreover, all dues relating to the license of the merging entities in that given service area, will have to be cleared before issue of the permission for merger of licenses by either of the two licensees

• The annual license fee and the spectrum charge are to be paid as a certain specified percentage of the AGR of the licensee. On the merger of the two licenses, however, the AGR of the two entities will also be merged and the license fee will therefore be levied at the specified rate for that service area on the resultant total AGR. Similarly, for the purpose of payment of the spectrum charge, the spectrum held by the two licensees will be added/merged and the annual spectrum charge will be at the prescribed rate applicable on this total spectrum

• However, in case of holding of spectrum for various technologies by the entity subsequent to M&A, spectrum charges and license fee or any other criterion being followed by the licensor shall be applicable as in case of any other UAS/CMTS licensee. The duration of licence of the merged entity in the respective service area will be equal to the remaining duration of the licence of the two merging licensees, whichever is less on the date of merger

• Prevailing guidelines on substantial equity shall continue for regulating acquisitions.

1.5.14 Mobile Number Portability

Mobile Number Portability (MNP) will enable subscribers to change their operators while retaining their number; this will not only give more choice to customers but also lead operators to further improve their services to retain their customers. The DOT issued guidelines for MNP service license on August 1, 2008. The DoT has envisaged guidelines for geographical division of the country into two Number Portability Zones (zone 1 and zone 2), each consisting of 11 licensed service areas. According to these guidelines, the MNP will be initially implemented in all metros and category A service areas within 6 months of award of MNP license. Subsequently, the operation of MNP will be expanded to the rest of the service areas in a time-bound manner.
Considering the implementation of MNP service for mobile subscribers, among various mobile service providers in the same service area, requires customization and upgradation of the existing networks to be capable of proving this service besides considerable time and effort. The DoT had initially decided to launch MNP by the fourth quarter of 2008; however, the implementation of MNP is now extended up to Mar 31, 2010. This will be implemented in the first phase for metro and Category A service areas in Delhi, Mumbai, Kolkata, Maharashtra, Gujarat, Andhra Pradesh and Tamil Nadu, including Chennai and Karnataka service areas.

1.5.15 Mobile Virtual Network Operator (MVNO) Policy

India is yet to implement a policy on the MVNO. According to TRAI recommendations to DoT an “MVNO is a licensee in any service area that does not have spectrum of its own for access service, but can provide wireless (mobile) access services to its own customers through an agreement with the licensed access provider, UAS/CMTS licensee. MVNOs are envisaged to work as a catalyst for the growth of the mobile sector. The introduction of MVNOs will help the mobile network operators to widen and deepen the market besides promoting competition. However, the concerned authorities will also consider that since MNP will also be introduced in the near term, introduction of MVNOs will not create bottlenecks in the implementation of MNP.

1.5.16 Spectrum Policy

With growing demand for telecommunication services and the proliferation of new technologies, demand for additional spectrum has been increasing. Spectrum is the most essential input for the growth of wireless services; its inadequacy not only hinders the growth but also adversely affects quality of services. In India, spectrum is shared among Defence, Railways, ONGC, etc and the two streams of Cellular Mobile Service Providers, that is, GSM and CDMA. Another technology, namely, Digital Enhanced Cordless Telecommunications (Cord-DECT) also shares spectrum, but as its reach is less, it is basically not substitutable for GSM and CDMA technologies.

Recognizing the importance of spectrum in the growth of wireless services, the Indian government has set up two committees - Spectrum Management Committee 1999 and a Steering Group on Spectrum Pricing 1999. The TRAI also issued recommendations
on spectrum-related issues in May 2005. Even the Twenty-eighth Report of the Standing Committee of the Parliament on Spectrum Management 2005 has highlighted issues regarding spectrum management. Assignment of Spectrum in India is governed by the National Frequency Allocation Plan (NFAP) 2002 and the international radio regulations of the International Telecommunications Union (ITU).

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The National Frequency Allocation Plan (NFAP) was developed way back in 1981 on the basis of the international frequency allocations and after taking into account the national spectrum requirements as well as technologies available during that time. Pursuant to the New Telecom Policy 1999 (NTP 1999), the NFAP was reviewed in a transparent manner with participation of all stakeholders and a revised NFAP was formulated known as NFAP 2000. Further, the NFAP 2000 was reviewed in view of changes in the International Radio Regulations and after taking into account the fast-growing national spectrum requirements in a transparent manner and the NFAP 2002 was also published. The NFAP has been reviewed from time to time, taking into account changes in international allocations as well as national spectrum requirements and emerging technologies.

With the trend in the telecommunication sector moving towards mobility, the government has recognized and has implemented automated spectrum management system in January 2005. This system will address bottlenecks in spectrum availability as radio frequency spectrum is one of the necessary ingredients of mobility. Electromagnetic spectrum is considered as a scarce natural resource and needs to be properly utilized to introduce new radio communication technologies.
In the report of Standing Committee on Information Technology 2006-07, a comprehensive spectrum policy was stated to be under consideration by the government taking into account all relevant aspects, including those recommended by the Standing Committee on Information Technology.

Further, during November 2007, the government constituted a committee to recommend revised subscriber-based spectrum allocation criteria. The committee in its report has recommended allocation of additional spectrum in steps of 1 MHz. The criteria for spectrum allotment will be based on the active subscribers, peak traffic of the operator’s network and demographic features of the service area. These criteria will be reviewed from time to time wherein relevant factors and technological developments will be taken into account.

1.5.17 Next Generation Network Recommendations (NGN)

The key aspects of the Next Generation Networks (NGN) are that these networks enable access through a variety of networks, and because they are based on internet protocol (IP) technology, they not only offer much cheaper bandwidth but also make available a wide variety of services. In March 2005, TRAI gave its recommendations on NGN; the main thrust was to bring out the urgent need for unified licensing regime to enable the NGN network to be utilized to their full capabilities and the promotion of broadband in the country. The emphasis was also given on the need for awareness building about the several aspects of NGN. The auction for 3G spectrum is scheduled in 2010 wherein spectrum usage rights shall be awarded separately for specific service areas. For 3G, the Government has decided to auction radio spectrum in the 2.1GHz band. 1 block of 2x5MHz spectrum in the 2.1GHz band has been allocated to MTNL (in Delhi and Mumbai) and BSNL (in all other service areas where a block is available). MTNL and BSNL have already rolled out 3G services in India.
1.6 Telecom Services & Infrastructure in India

There have been some important regulatory changes which were introduced post liberalization which have provided an immense boost to development of this sector. These regulatory changes by and large trace their roots to the objectives and vision set out by the Government in NTP 99.

**Universal Service Obligations:** It is an accepted fact that improved rural penetration is a key priority area for most developing countries. The concept of Universal Service Obligation ("USO") has been mooted by many developing countries and is grounded on the principle that effective means of communication is a must for economic and social development. NTP 99 envisaged the provision of basic telecommunications services to all at affordable rates. Keeping in line with NTP 99 and the recommendations of the Telecom Regulatory Authority of India on the issues relating to the Universal Service Obligation the Universal Service Support Policy was framed and came into effect from April 2002. The Indian Telegraph (Amendment) Act, 2003 gave statutory status to the Universal Service Obligation Fund ("USOF"). USOF is used to subsidize developments in the telecom sector in the rural areas such as: Increasing wireless network; providing public access through public or community phones; providing individual household telephones.

The resources for meeting the USOF are to be generated through a Universal Service Levy ("USL"), which would be a percentage of the revenue earned by the operators under various licenses. The USL presently is 5% of the Adjusted Gross Revenue earned by all operators except pure value added services providers like voice mail and e-mail.

**Unified Access Regime:** Prior to the introduction of Unified Access Regime, basic and cellular operators were issued separate licenses to operate and provide basic and cellular services in different telecom circles in the country. The terms of the license agreement for a basic and cellular provider were distinct from one another with respect to entry fee, spectrum allocation and interconnection charges. Given the central aim of NTP 99 to ensure rapid expansion of tele-density, which coupled with various other factors such as the advances made in technologies and the reduction in
the costs of providing telecommunications services made it imperative for the Government to introduce a regime wherein the provision of telecom services are made technology neutral. The Government issued Guidelines for Unified Access License in November 2003. Under unified licensing, a service provider can offer both fixed and mobile services under one license. Thus, while cellular operators can offer basic services, basic operators can offer cellular services all under the same license. Further, under unified licensing, the Government has no control over technology which is left to market forces. Unified licensing has greatly benefitted the consumers in terms of lower prices due to the economies of scale and affordable telecommunication services. Further unified licensing also simplifies the procedure of licensing in the telecom sector and ensures flexibility and efficient utilization of resources keeping in mind technological developments.

It should be noted that TRAI in its January 2005 Recommendations on Unified Licensing has rooted for a new licensing regime where there shall be no restrictions on usage of Internet Telephony or other IP enabled services provided that they are offered by operators with Unified License who have duly paid the prescribed registration charges and who will be subjected to license fees.

**Interconnection:** India today has a plurality of service providers and service networks. In such a situation, efficient interconnection between a variety of access networks (such as fixed, mobile, national long distance and international long distance) has to interconnect to make national and international connectivity possible. In 2003 TRAI implemented the Telecommunications Interconnection Usage Charges Regulation to fix terms and conditions of interconnectivity between service providers and to regulate arrangements among service providers for sharing their revenue derived from provision of telecommunication services.

The Government of India has the exclusive right to own and operate telecommunication devices and services and the manner in which the government can grant license to third parties to carry out these functions. In this respect, a license is the pivot on which this industry operates. A telecom license is an agreement between the Government of India i.e. the Department of Telecommunications (licensor) and
the operator/service provider (licensee) and is only entered into upon the fulfillment of various conditions by the service provider. The provision of any telecommunication service in India without a valid license/registration is not permitted.

It should be noted that the government is bound to ensure that its licensing decisions are rational, transparent and free from arbitrariness. The courts have time and again upheld this principle of transparency. In the case of Delhi Science Forum v Union of India, the decision of the government to invite tenders from non-governmental and private entities for license to provide telecommunications services was challenged in a writ petition wherein it was contended that the sensitive nature of telecommunications mandated that it should not be placed in the hands of the private sector and any step in this direction would not only endanger the national security of the country but would not serve the economic interest of the country. The Supreme Court dismissed the writ and categorically held that the privatization policy adopted by the government is a necessary consequence of liberalization and the grant of telecommunications licenses to non-governmental organizations would greatly improve telecom services. However the Supreme Court also emphasized the procedures adopted for such grant should be "reasonable, rational and in conformity with the conditions which have been announced."

The telecommunication services can be categorized into following main categories which are as under:

1. **Unified Access Services ("UAS") and Cellular-Mobile Telephone Services ("CMTS")**

The country is divided into 23 service areas consisting of 19 telecom circle service areas and 4 metro service areas for providing UAS and CMTS.

- **UAS**: UAS operators can provide, within their area of operation, wireline (basic) as well as wireless (cellular) services in a service area. Wireless services include Full Mobile, Limited Mobile and Fixed Wireless services. Further, UAS operators can also provide voice mail, audiotex services, video
conferencing, videotex, e-mail, Closed User Group (CUG) as Value Added Services over its network to the subscribers falling within its service area on non-discriminatory basis. No service can be provided by the UAS operator for which a separate license is required. However, intimation before providing any other VAS has to be sent to the DoT and TRAI.

Basic and Cellular Services Licensees are permitted to migrate to UAS License regime. The service providers migrating to UAS License will continue to provide wireless services in already allocated/contracted spectrum and no additional spectrum will be allotted under the migration process.

- **CMTS**: CMTS operators are free to provide, within their area of operation, all types of mobile services including voice and non-voice messages, data services and Public Call Offices (PCOs) utilizing any type of network equipment, including circuit and/or package switches that meet the relevant International Telecommunication Union (ITU) /Telecom Engineering Centre (TEC) standards.

The UAS and CMTS operators are required to pay a certain percentage of Adjusted Gross Revenue ("AGR") as license fee apart from paying spectrum charges. Frequencies are assigned by the WPC wing of the DoT from the frequency bands earmarked in the applicable National Frequency Allocation Plan and in coordination with various users.

Consequent upon announcement of guidelines for Unified Access (Basic& Cellular) Services licenses in November 2003, some of the CMTS operators have been permitted to migrate from CMTS license to UAS License.
2. National Long Distance ("NLD") and International Long Distance ("ILD")

- **NLD:** NLD service refers to the carriage of switched bearer telecommunications service over a long distance and NLD service licensee have the right to carry inter-circle traffic excluding intra-circle traffic except where such carriage is with mutual agreement with originating service provider. NLD service licensees can make mutually agreed arrangement with the Basic Service Providers for picking up the traffic for the leg between Long Distance Charging Centre (LDCC) and Short Distance Charging Centers (SDCCs).

- **ILD:** ILD Service is defined as a network carriage (also called Bearer) service, providing the NLD operators in the country International connectivity to network facilities operated by foreign carriers in other countries. ILD service providers can provide bearer services so that end-to-end tele-services such as voice, data, fax, video and multi-media can be provided by Access Providers to the customers.

3. Internet Service Licenses (ISP)

ISP licensees are primarily allowed to provide services such as internet access (through any method including IPTV) and internet telephony (which is a service to process and carry voice signals offered through the internet by the use of personal computers ("PC") or internet protocol based equipment). Currently the ISP license allows limited internet telephony by permitting connections between the following:

- PC to PC (within or outside India).
- PC / a device / Adapter conforming to standard of any international agencies like ITU or IETF etc in India to PSTN/PLMN abroad.
Any device / Adapter conforming to standards of International agencies like ITU, IETF etc. connected to ISP node with static IP address to similar device / Adapter within or outside India.

4. **Mobile Number Portability ("MNP")**

MNP allows mobile subscribers to retain their existing telephone numbers when they switch from one telecom operator to another irrespective of mobile technology. India has long felt the need for MNP. In September 2009 TRAI introduced the Telecommunications Mobile Number Portability Regulations, 2009. As per the regulations, the subscribers would be allowed to retain their mobile number while moving from (within the same service circle):

- One access provider to another irrespective of the mobile technology / platform; or
- One cellular mobile technology to another of the same access provider.

Thus effectively a subscriber can move from a CDMA service provider to a GSM service provider in a seamless manner.

For the purpose of implementing MNP, the country has been divided into two geographical zones and MNP license has been issued to one operator in each zone provide centralized database, query response and clearing house to enable correct routing and termination of calls by access-service providers and International Long Distance operators post MNP implementation. The DoT has issued license to two players for implementation of MNP services in the country in Zone 1 and Zone 2 respectively.

These developments have been implemented by the government in order to further the objective of creating and maintaining a level playing field in the industry and increasing completion.
The implementation of MNP which was stated to have taken place by December 31, 2009 had been postponed to March 31, 2010 for all circles in order to enable the MNP operators and the service providers to be better prepared to implement MNP in an effective manner.

India is one of the world's fastest growing telecom markets and it continues to be amongst the world's lowest telecom tariff destinations. As such the implementation of MNP will ensure that every telecom mobile service provider offers mobile number portability to all its subscribers both post paid and pre-paid on a non-discriminatory basis. The telecom operators on their part would have to incur huge expenses by way of capital expenditure and operational expenses in order to effectuate and operationalize MNP. With the Indian tariff structure already at the lowest in the world, the revenues of the telecom operators are likely to be affected with the implementation of MNP with subscribers having the freedom to migrate to better service providers. This in turn is likely to compel the telecom service providers to improve the quality of their service to avoid losing subscribers. This can be seen as maturing element of the Indian telecom industry and a natural step for the industry to go forward.

5. Other Services

There are certain telecommunication services where no specific license is required; however a registration is required subject to fulfilling certain criteria. These include:

- **Infrastructure Provider Category-I ("IP-I")**: Under IP-I registration, a company can provide assets such as Dark Fibre, Right of way, duct space, tower, etc to licensed telecom service providers. This category was opened to private sector only from August 13, 2000. There is no restriction on foreign equity, number of entrants, no entry fee and no bank guarantee requirement for providing such registration.
Earlier, apart from IP-I, there was another category of infrastructure provider, Infrastructure Provider Category-II ("IP-II"). A license was issued to provide infrastructure services by way of IP-II. Under the IP-II license the service provider could lease/rent out/sell end to end bandwidth i.e. digital transmission capacity capable to carry a message. This was opened to private sector with effect from August 13, 2000. Although there was no entry fee and number of players for IP-II there were certain restrictions on foreign investment front. However, issuance of IP-II licences have been discontinued since December 14, 2005.

- **Other Service Provider (OSP):** Call centres (international and domestic), BPOs, Network Operation Centres, Vehicle Tracking Systems, services with respect to tele-banking, tele-medicine, tele-education are allowed to operate (with 100% FDI) upon registration as "Other Service Provider" or "OSP" with the DoT. These OSP's operate the service using the telecom infrastructure provided by licensed telecom service providers. There are various security related obligations imposed on various telecom licensees (as discussed later in this paper). As security related conditions are applicable to all licensed telecom service providers, the security conditions shall not be separately enforced on OSPs. An interesting development in the OSP registration policy is the amendment that was announced in August 5, 2008 which officially recognized the "work from home" provided certain financial guarantees are provided.

6. **Telecom Infrastructure**

The telecom sector is a very capital intensive sector and involves high value investments. The telecom licenses permit the telecom operators to share passive infrastructure such as building, tower, dark fibre, etc. However the procurement and maintenance of active infrastructure proves to be a very expensive affair for operators. With the robust growth in the telecom sector, the government recognized that infrastructure sharing would greatly reduce costs for the operators. The DoT accepted TRAI's recommendations and issued Guidelines on Active Infrastructure Sharing on April 2008. Active
Infrastructure consists of antennas, cables, radio access networks, transmission systems and other technical equipments which are required to transmit mobile calls. We discuss some of the salient features of the guidelines:

- Service Providers can share active infrastructure based on mutual contractual arrangements.
- Sharing of allocated spectrum is not permitted.
- Infrastructure Providers Category-I (IP-I) are allowed to seek clearance for erecting towers with or without agreement with licensed service providers.
- No subsidy shall be paid if newly erected tower is not shared with existing service providers.
- Reduction in the timeframe for the SACFA to clear applications for setting up of towers and other related infrastructure from 90 days to 45 days.
- Infrastructure Providers will have to set up the infrastructure site(s) within one year from the date of signing of the agreement with Universal Services Obligation Fund ("USOF") if the subsidies under USOP need to be availed. Further, Infrastructure Providers and telecom service providers can jointly bid for projects undertaken by USOF.

As a result of this policy, new entrants who are allotted spectrum by the WPC can easily launch their telecom services within a short period by taking the assistance of the existing active infrastructure of other telecom service providers will not have to incur huge infrastructural costs.

Over the years, Bharti Airtel has made huge investments to create the cellular infrastructure across the country. Soon it hived off its mobile tower business into a separate subsidiary to become a major player in the tower sharing business. Another major player, Reliance Communication (RCom), has already hived off its tower business into a separate subsidiary. With increasing operational and infrastructure costs, many telcos are now joining hands to share their existing infrastructure. Some of the deals include the following:

- In December 2007, Quippo Telecom acquired 1000 towers from Spice Telecom.
• In January 2009, Quippo Telecom and Tata Teleservices Limited merged its passive infrastructure businesses to create one of India's largest Independent Telecom Infrastructure Company.

• In February 2009, Quippo Telecom and Tata Teleservices Limited's Wireless TT Info Services Limited (WTTIL) signed up a tower sharing agreement with Unitech Wireless. Under this agreement, Unitech Wireless will lease tower infrastructure from WTTIL and Quippo Telecom across India. Etisalat DB, which has acquired a 45% stake in Swan Telecom has signed a 10-year tower sharing deal with the hived off infrastructure arm of RCom.
1.7 Role of Telecom Industry in Development of India

1.7.1 Contribution to GDP

According to the UNCTAD, there is a direct correlation between the growth in mobile teledensity and the growth in GDP per capita in developing countries, which tend to have a high percentage of rural population. The share of the telecom services industry in the total GDP has been rising over the past few years (the telecom sector contribution in GDP went up from 2.52% in FY05 to 2.83% in FY07).

Economic Benefits of Telecom Industry

Source: D & B Research

1.7.2 Employment

The Indian telecommunication industry employs over 400,000 direct employees and about 85% of these employees are from government-owned companies. The ratio of number of subscribers to employees, an indication of efficiency and profitability, is much higher for private companies than for government companies.
1.7.3 Foreign Direct Investment (FDI)

Foreign direct investment has been one of the major contributors in the growth of the Indian economy, and therefore, the need for higher FDI is felt across sectors in the Indian economy. The telecom sector has played a crucial role in attracting FDI in India. The share of telecom sector in the total FDI inflows in India has gone up to 10% in FY09 as compared with just 3% in FY05.

The telecom sector requires huge investments for its expansion as it is capital-intensive and FDI plays a vital role in meeting the fund requirements for expansion of the telecom sector. Telecom accounts for almost 10% of the total FDI inflows in the country and has been the third-largest sector to attract FDI in India in the post-liberalization era.

The Indian telecom industry has been an attractive avenue for foreign investors over the years. As per DIPP figures, the cumulative FDI inflow during August 1991 to June 2009 period, in the telecommunication sector amounted to US$ 113 bn. FDI calculation takes into account radio paging, cellular mobile and basic telephone services in the telecommunication sector.

In the 2004-05 Budget, the government raised the FDI limit from 49% to 74% in the telecom services segment subject to retention of local management control. According to the new norms, 26% share out of the 74% should be held by an Indian company or an Indian citizen with Indian management. Further, 100% FDI is permitted in telecom manufacturing, category-I infrastructure providers, ISPs without gateway, call centers and IT-enabled services. Further, direct or indirect FDI up to 74% is permitted subject to licensing and security requirements for ISPs with gateways, radio paging operators and category II infrastructure providers.

The relaxation in FDI norms has attracted many foreign telecom majors to the sector. The presence of foreign players has not only encouraged faster infrastructure development and upgradation but also has opened up the domestic industry to foreign competition. Since 2004, there has been a large inflow of FDI in the sector. During 2004-05 and 2005-06, a period during which the FDI norms were relaxed, the FDI inflow grew by an astounding 300% to US$ 624 mn in 2005-06 from merely US$ 125
The inflow of FDI has provided tremendous impetus to the sector in the past few years and the attractiveness of the sector has kept the FDI inflows growing steadily. During FY09 the FDI in the telecom sector at US$ 2,558 mn was 103% higher than that seen in FY08 at US$ 1,261 mn. Further, the FDI in the sector has already reached US$ 2010 mn for a six month period of FY10 (Apr-Sep 09) and is expected to surpass the total FDI for FY09.

The government’s liberalized FDI policies have resulted in several foreign companies entering into the Indian markets. The influx of foreign players in the Indian telecom industry has led to capacity creation, and better infrastructure, which in turn has bettered the network quality. The rise in FDI has also enabled technology transfer, market access and has improved organizational skills; going forward, FDI could be used for providing telecom services to rural areas, where teledensity is still very low.

The change in FDI policy that has raised the FDI limit from 49% to 74% for the sector has made it more attractive for foreign players. In the long run the growth prospects of telecom players that have foreign partners will improve and other players will get new avenues to raise capital.

1.7.4 Growth of IT-ITeS and Financial Sector

India has entered the league of countries with the most-advanced telecommunication infrastructure after the industry was deregulated. Furthermore, deregulation has stimulated India’s economic growth through industry growth and through rise in investments. It is evident that a well-developed communication sector improves access to social networks, lowers transaction costs, increases economic opportunities, widens markets, and provides better access to information, healthcare and educational services. The growth in Indian telecom sector has been concomitant with overall growth in GDP, government revenue, employment et al. Besides, telecommunication has increased efficiency, reduced transaction costs, attracted investments and has created new opportunities for business and employment.

The NTP-99 was particularly helpful for the ITeS-BPO industry as it ended the government monopoly in international calling by introducing IP telephony. After the introduction of IP telephony, there was rapid growth in the number of data processing
centers and inbound/outbound call centers, which ultimately led to the outsourcing revolution in India.

The telecom sector has been instrumental in creating jobs for a vast pool of talented and knowledge professionals in the IT and ITeS-BPO industry, which thrives on reliable telecommunication infrastructure. India has become an important outsourcing destination for the world and the boom in this sector also has transformed India’s economic dynamics. The evolution of telecom sector has brought about a revolutionary change in the way some businesses operate.

Another beneficiary of the telecom revolution is the financial services industry, which has been on a growth trajectory. The progress and quality of the financial sector has been a key factor that has driven the pace and diversity of the real economy. India has an extensive and well-developed financial sector with wide and sophisticated banking network. Banking in India has become service-oriented, and has matured greatly from the days of walk-in customers to the present situation when banks have migrated to a 24-hour banking platform to attract customers; however, this disintermediation in the business has led banks to be extremely prudent in terms of their internal operations and has led them to adopt newer products and delivery channels. Further, with introduction of internet & mobile banking the long queues at the banks are slowly becoming a thing of the past.

Both the financial and the IT-ITeS segments rely on good domestic as well as international network connectivity; therefore, there is a need for a sound telecommunication network.
1.8 Factors Facilitating Growth of Telecom Industry

The phenomenal growth in the Indian telecom industry was brought about by the wireless revolution that began in the nineties. Besides this, the following factors also aided the growth of the industry.

1.8.1 Liberalization

The relaxation of telecom regulations has played a major role in the development of the Indian telecom industry. The liberalization policies of 1991 and the consequent influx of private players have led the industry on a high growth trajectory and have increased the level of competition. Post-liberalization, the telecom industry has received more investments and has implemented higher technology.

1.8.2 Increasing Affordability of Handsets

The phenomenal growth in the Indian telecom industry was predominantly aided by the meteoric rise in wireless subscribers, which encouraged mobile handset manufacturers to enter the market and to cater to the growing demand. Further, the manufacturers introduced lower-priced handsets with add-on facilities to cater to the increasing number of subscribers from different strata of the society. Now even entry-level handsets come with features like colored display and FM radio. Thus, the falling handset prices and the add-on features have triggered growth of the Indian telecom industry.

1.8.3 Prepaid Cards Bring in More Subscribers

In the late nineties, India was introduced to prepaid cards, which was yet another milestone for the wireless sector. Prepaid cards lured more subscribers into the industry besides lowering the credit risk of service providers due to its upfront payment concept. Prepaid cards were quite a phenomenon among first-time users who wanted to control their bills and students who had limited resources but greater need to be connected. Pre-paid cards greatly helped the cellular market to grow rapidly and cater to the untapped market. Further, the introduction of innovative schemes like recharge coupons of smaller denominations and life time incoming free cards has led to an exponential growth in the subscriber base.
1.8.4 Introduction of Calling Party Pays (CPP)

The CPP regime was introduced in India in 2003 and under this regime, the calling party who initiated the call was to bear the entire cost of the call. This regime came to be applicable for mobile to mobile calls as well as fixed line to mobile calls. So far India had followed the Receiving Party Pays (RPP) system where the subscriber used to pay for incoming calls from both mobile as well as fixed line networks. Shifting to the CPP system has greatly fuelled the subscriber growth in the sector.

1.8.5 Changing Demographic Profile

The changing demographic profile of India has also played an important role in subscriber growth. The changed profile is characterized by a large young population, a burgeoning middle class with growing disposable income, urbanization, increasing literacy levels and higher adaptability to technology. These new features have multiplied the need to be connected always and to own a wireless phone and therefore, in present times mobiles are perceived as a utility rather than a luxury.

1.8.6 Increased Competition & Declining Tariffs

Liberalization of the telecom industry has fuelled intense competition, especially in the cellular segment. The ever-increasing competition has led to high growth of subscribers and has put pressure on tariffs, which have seen a sharp drop over the years. When the cellular phones were introduced, call rates were at a peak of Rs 16 per minute and there were charges for incoming calls too. Today, however, incoming calls are no longer charged and outgoing calls are charged at less than a rupee per minute. Thus, the tariff war has come a long way indeed. Increased competition and the subsequent tariff war has acted as a major catalyst for attracting more subscribers. Apart from these major growth drivers, an improved network coverage, entry of CDMA players, growth of value-added services (VAS), advancement in technology, and growing data services have also driven the growth of the industry.
1.8.7 Outlook

The telecom industry in India has experienced exponential growth over the past few years and has been an important contributor to economic growth; however, the cut-throat competition and intense tariff wars have had a negative impact on the revenue of players. Despite the challenges, the Indian telecom industry will thrive because of the immense potential in terms of new users. India is one of the most-attractive telecom markets because it is still one of the lowest penetrated markets. The government is keen on developing rural telecom infrastructure and is also set to roll out next generation or 3G services in the country. Operators are on an expansion mode and are investing heavily on telecom infrastructure. Foreign telecom companies are acquiring considerable stakes in Indian companies. Burgeoning middle class and increasing spending power, the government’s thrust on increasing rural telecom coverage; favorable investment climate and positive reforms will ensure that India’s high potential is indeed realized.
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